DELPHI

Application of a Diesel Fuel Reformer for Tier 2 Bin 5 Emissions

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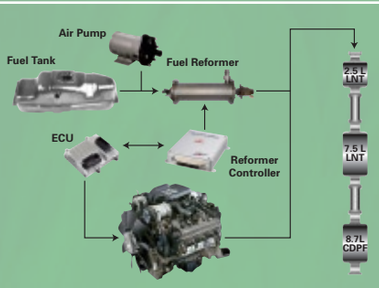
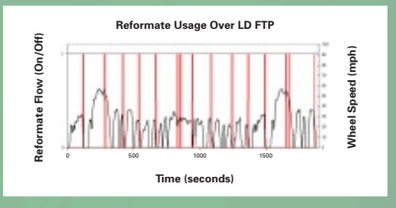
On-board diesel fuel reformation is being evaluated as an alternative to urea SCR to meet Tier 2 Bin 5 emissions

APPROACH

- Partial oxidation reformer generates hydrogen & carbon monoxide on demand from vehicle controller
- Reformate is used to regenerate the NOx trap at idle, cruise, and accelerations
- Prototype system integrated into 2002 Silverado with 6.6 L engine and demonstrated on US LD Transient Emissions Test (FTP-75)



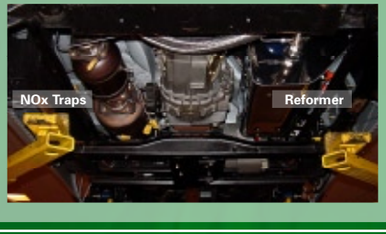


PROGRESS

Vehicle Integration

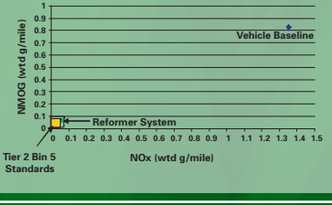
Mule Vehicle

Underbody View



FTP Emissions Results

FTP Emissions Improvement with On-board Reformer System



FTP Bag Emissions

FTP-75 Test	NMOG wt.g/mi	CO wt.g/mi	NOx wt.g/mi
DFR System Average	0.068 (92% Eff)	4.172 (20% Eff)	0.053 (96% Eff)
σ	0.009	0.541	0.006
T2B5 50k Standard	0.075	3.4	0.05
T2B5 120k Standard	0.09	4.2	0.07

INTEREST TO THE DIESEL ENGINE COMMUNITY

- LNT regenerations without post injection
  - Reduced oil dilution
  - Regeneration possible at idle
- Maintenance-free operation
  - No additional fluids required on-board
- Tier 2 Bin 5 emissions without major engine modifications
- Reduced dependence on precious metals expected compared to conventional NOx adsorber system
- Fuel economy expected to be equal to or better than non-reformer system
  - Improves LNT low temperature performance
  - Better utilization of fuel for LNT regeneration

FUTURE WORK

Demonstrate Production Viable Integrated System on 2004 Truck

- Demonstrate NOx adsorber desulfation during the FTP-75 & US-06
- Demonstrate DPF Regeneration during the FTP-75 & US-06
- Demonstrate Tier 2 Bin 5 emissions with reduced precious metals to make the system cost competitive with urea SCR